

ABSTRACT
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The Government Intervention in the Pricing of Wheat in the United States
and Its Global Effects

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This thesis was concerned with a quantification of the effects of a government intervention in the pricing of wheat in the United States. First, standard partial equilibrium comparative static analysis in the Marshallian economic surplus framework--welfare theory--was used to calculate the net social loss in consumption, net social loss in production, welfare gain of producers, and welfare gain of consumers. Second, a Marshallian demand function--theory of consumer behavior--was employed through the use of ordinary least squares techniques to estimate the parameters in the aforementioned welfare theory. Lastly, partial equilibrium market model--a linear model of price determination in an isolated market--was used to show the diagrammatic effects of equilibrium price.

It was found in this study that government intervention in the pricing of wheat has a negative rate of protection on the domestic consumption of wheat, i.e., the quantity of wheat consumed in this country is substantially less than what it would have been in the absence of price distortions.

THE GOVERNMENT INTERVENTION IN THE PRICING OF WHEAT
IN THE UNITED STATES AND ITS GLOBAL EFFECTS

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DEDICATION

This thesis is dedicated to my lovely wife Bernadine, for her support, patience, and kindness. Her belief in a beautiful tomorrow has become my daily source of strength; thus, I am able to do the things I do.

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CHAPTER I

INTRODUCTION

Price instability in the agricultural sector of the United States has been an issue of long concern to farmers, economists and government officials, and over the years, a great deal of effort has been made by many economists to explain its effects. The focus has been on who loses from these price changes.

Instability originates basically from two sources, namely, real and policy induced ones.¹ Natural random factors influence both supply and demand of agricultural commodities. Production of farm products can be affected by weather, technological change, and in some cases, by input variability. Demand, on the other hand, varies in most cases, due to fluctuating income and taste changes.

In response to the problem of price instability, one observes an increase in legislation by authorities designed to protect the farm sector. These range from "set-aside" schemes, to income support-deficiency payments, and in some cases, direct subsidies are given to farmers. "In the United States, target prices are established and farmers participating in "set-aside" schemes receive deficiency payment amounting to the difference between the target prices and the average market prices."² Products under

¹D. Heien, "Price Determination Process for Agricultural Sector Models," American Journal of Agricultural Economics, 59 (1977), p. 126.

²D. G. Johnson, "World Agriculture, Commodity Policy, and Price Variability," American Journal of Agricultural Economics, 56 (1975), p. 823.

this scheme are mainly foodgrains and feedgrains.³

In general, government intervenes in agricultural price-setting mechanism in many different ways and for assorted reasons. For example, export taxes on agricultural products provide government revenue and help keep domestic prices low; and vary significantly, the authorities provide these "set-aside" schemes, income support-deficiency payments programs, and subsidies as measures to prevent competition from other countries.

Problem Statement

Many countries--industrialized and developing--engage in protectionism as a tool against foreign competition even though it is well documented that such practices led to price instability at the world market.⁴

Johnson, examining the International Wheat Agreement signed in Washington on March 23, 1949--an agreement that fixed the price and the quantity of wheat to be imported and exported--, stressed the problem that such procedure creates. He has argued that such action, which is against free trade, will increase fluctuations of wheat prices at world market.⁵ There is, however, a body of literature that corroborates this

³D. G. Johnson, "World Agriculture, Commodity Policy, and Price Variability," American Journal of Agricultural Economics, 56 (1975), p. 823.

⁴S. Y. Shei and R. L. Thompson, "The Impact of Trade Restrictions on Price Stability in the World Wheat Market," American Journal of Agricultural Economics, 59 (1977), p. 629.

⁵H. G. Johnson, "The Destabilizing Effect of International Commodity Agreements on the Prices of Primary Products," The Economic Journal, 3 (1950), p. 626.

view, namely, the more the degree of protectionism, the more the violent fluctuations in prices at the world market.⁶

Bale and Lutz, addressing the distortions of prices of farm products by government authorities, contend that such measure is disadvantageous to the farm sector of the exporting country in terms of the realization of full potential output.⁷

Wheat is a major exportable foodgrain of this country, and over the years the quantities exported have continued to increase from 30,987 in 1979 to 48,011 in 1982 (in '000 metric tons).⁸

In recent years, it has also become an instrument used by government authorities to achieve political objectives. This problem was manifested during the Jimmy Carter Administration when an embargo was placed on the sale of wheat to the Soviet Union, and was considered a problem because the Soviet Union is a major market for wheat from this country.

The expanded use of economic sanctions in the world today suggest that studies are needed that will allow us to predict future consequences. Very little literature exists on the wheat market. This study is therefore concerned with wheat market from the point of views of economic sanctions

⁶S. Y. Shei and R. L. Thompson, "The Impact of Trade Restrictions on Price Stability in the World Wheat Market," American Journal of Agricultural Economics, 59 (1977), p. 632.

⁷M. D. Bale and E. Lutz, "Price Distortions in Agricultural and Their Effects: An International Comparison," American Journal of Agricultural Economics, 63 (1981), p. 21.

⁸World Wheat Statistics, International Wheat Council, London, 1984.

and protectionism, and attempts to provide empirical and quantified evidence on the consequences of the latter.

Objective

The fundamental objective of this study is to evaluate the effects of government intervention policies on the pricing of wheat in the United States. This will be achieved through the following.

- 1) Identifying and quantifying various measures of consumer welfare, including net social loss in production.
- 2) Measuring the parameters in the consumer welfare analysis by estimating demand as a function of prices and income.
- 3) And using the results in (1) and (2) above to explain the domestic and international ramifications.

Research Procedure

This study will begin with a detail review of the relevant literature related to government intervention on the pricing policies in the United States. This will cover historical perspective of protectionism, the international and domestic effects, and the global welfare implications.

Based on the review, the important factors operating in the United States and the world wheat market will be identified. The interactions between the factors will be expressed in mathematical terms and estimated.

One of the postulates that will be made in this study is that world price is equilibrium price. Mathematical and diagrammatic analysis will

be provided to show the effect of equilibrium price on the quantity of wheat in this country.

Finally, the policy implications of all the results of the study will be emphasized.

Hypothesis

Although government intervention in the pricing of wheat in this country is of immense advantage to the farmers, it is undesirable in terms of global welfare.

Justification

This study will make evident the dominant role that price plays in the wheat market. It will also show that government distortions of wheat prices result in a drastic reduction of the domestic consumption of wheat in this country. The empirical evidence is designed to aid policy makers towards formulating legislations that are prudent for the farm sector.

CHAPTER II

LITERATURE REVIEW

The literature review is divided into three sections: First, the historical perspective of protectionism of wheat prices is traced; second, the recent studies on this question with emphasis on international and domestic effects are evaluated; and third, the global welfare implications are given a detail consideration.

Johnson (1950), discussed the stated objectives of the International Wheat Agreement signed in Washington on March 23, 1949--to assure supplies of wheat to importing countries and markets for wheat to exporting countries at equitable and stable prices.⁹ "These objectives were to be secured by an agreement between the major importing and exporting countries fixing a maximum quantity of wheat which the importing countries may be required to buy from the exporting countries at an agreed minimum price, and which the exporting countries may be required to sell to the importing countries at an agreed maximum price."¹⁰

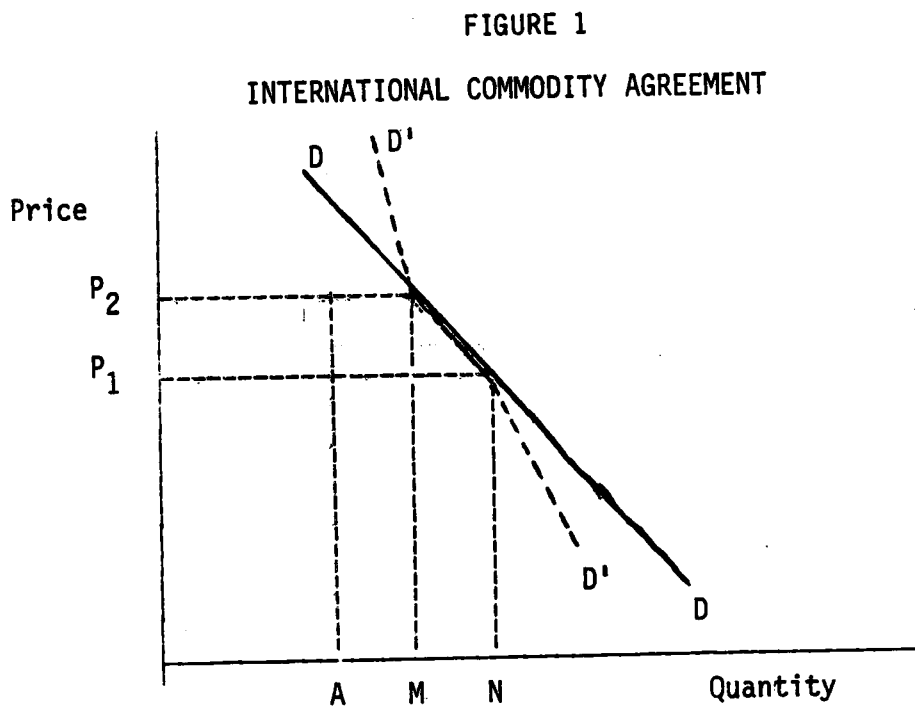
He represented diagrammatically the effect of the agreement on the demand for the commodity as shown in Figure 1.

A) DD represents the demand curve as it would be in the absence of any agreement.

⁹H. G. Johnson, "The Destabilizing Effect of International Commodity Agreement on the Prices of Primary Products," The Economic Journal, 3 (1950), p. 627.

¹⁰Ibid.

- B) OA is the guaranteed purchase under the agreement.
- C) OP_1 represents the guaranteed minimum price.
- D) OP_2 denotes the guaranteed maximum price.
- E) ON and OM are the total amounts that would be demanded at the two prices.
- F) D^1D^1 denotes the demand curve when the agreement is in operation.



In the analysis, Johnson has contended that if the total amount supplied falls short of OM (the quantity at which price would rise to the maximum set by the agreement), the price at which the quantity not

covered by the agreement would be higher than the price which would have cleared the total supply if there had been no agreement. Similarly, the opposite is true when the amount supplied exceeds ON. Thus it became obvious that unless quantity variations remain within the OM-ON, and price variations remain within the $OP_1 - OP_2$ in which case the agreement would have no effect on the market. The effect of the agreement would be to increase fluctuations in prices.

In general therefore, it would seem that an agreement of the International Wheat Agreement type would tend to make fluctuations in price more violent than they would otherwise be.

It is interesting to note that Johnson successfully made the point about the agreements and how they would increase fluctuations in prices. However, there was nothing in his article that suggested an alternative. It was in an attempt to find a workable model that the concept of duopoly was developed.

McCalla (1966) has considered the market for wheat as a duopoly.¹¹ He argued that only the United States and Canada possessed facilities necessary to hold the stocks required to exert market power. He defined market power as the willingness and ability to hold stocks.

He developed a model of duopoly pricing, and it was concerned with pricing along the residual demand curve facing the duopolists. This he

¹¹A. F. McCalla, "A Duopoly Model of World Wheat Pricing," Journal of Farm Economics, 58 (1966), pp. 711-727.

obtained by subtracting the supply curves of competing exporters and producers from the world demand curve.

The point should be made that the results reached by McCalla in his analysis can only be explained in line with the assumptions he made.

- A) He assumed that wheat is a homogeneous commodity.
- B) Each seller is aware of how the other will react to his own actions.
- C) There is a price leadership and Canada is the leader.
- D) There is a maximum price above which the second seller will not follow the leader.
- E) The leader has some minimum quantity he must sell and some minimum price which he would rather hold than sell.
- F) Both sellers wish to maximize exports.

What is apparent here is that these assumptions defined a set of prices and quantities in which a solution was obtained. Based on this analysis, it was McCalla's contention that because of the market power possessed by Canada and the United States, the price formation in the world wheat market would largely be determined by them.

This view contrasts with that of Alaouze, Watson and Sturgess (1978),¹² who rejected the concept of duopoly pricing as presented by McCalla. They argued, first, that there was severe contraction in the demand facing the duopolists, and it could lead to a breakdown of the

¹²C. M. Alaouze; A. S. Watson; and N. H. Sturgess, "Oligopoly Pricing in the World Wheat Market," American Journal of Agricultural Economics, 60 (1978), pp. 173-185.

duopoly. Second, an increase in the exportable surplus of one of the suppliers would have a destabilizing influence on the duopoly. And lastly, they argued that when duopoly pricing is consistently followed, the total market share of the duopolists could not be maintained. A shift in the residual demand curve toward the price axis, other things being equal, could distort the market shares of the duopolists.

The authors, diagrammatically represented a triopoly model that included the United States, Canada and Australia, and argued that this formation was the only way the market shares of the duopolists could be maintained. The inclusion of Australia--the third largest wheat exporter--in the arrangement would render the possible shifts in the demand curve of no effect.

The authors maintained that triopoly would enable the three major exporters of wheat to retain their market shares and consequently allowed them to determine the world wheat prices.

Carter and Schmitz (1979) disagreed with Alaouze, Watson and Sturgess, and McCalla on the concepts of triopoly pricing and duopoly pricing respectively.¹³ The major thrust of these concepts was that price formation in the world wheat market was largely determined by the major exporters. Carter and Schmitz argued that in light of the trade restrictions that have been set up by the major wheat importers in the interna-

¹³C. Carter and A. Schmitz, "Import Tariffs and Price Formation in the World Wheat Market," American Journal of Agricultural Economics, 61 (1979), pp. 517-521.

tional market, the effect of a duopoly or triopoly arrangement was relatively minor. They maintained that world wheat prices are determined by the major wheat importers. "It is the restrictive policies of the importers (whether consciously or not) that are likely to result in a welfare gain to importing countries greater than under free trade."¹⁴

The authors combined graphical analysis--optimum tariff solutions--which were estimates, with actual price and compared them.

They recognized that the structure of the wheat market was more complex than depicted in their analysis, but stressed that market power on the part of importers of wheat was greater than the power attributed to exporters by previous researchers.

This author accepts as true the key point made in the articles by Alaouze, Watson and Sturgess, and McCalla, namely, that world wheat prices are determined by the major wheat exporters. In fact, this point has to hold true in light of the central premise of this study and the postulate made earlier.

The Domestic and International Effects of Intervention Policies

In order to balance the very many areas that have to be covered in this study, the international and domestic ramifications of protectionism are considered.

¹⁴C. Carter and A. Schmitz, "Import Tariffs and Price Formation in the World Wheat Market," American Journal of Agricultural Economics, 61 (1979), p. 519.

Bale and Lutz (1981) analyzed the effects of agricultural policies in industrialized nations on their domestic economies, the world commodity markets, and developing countries.¹⁵ They relied heavily on diagrammatic representations to show that all the real and monetary effects of agricultural protectionism depended on the size of the tariff as well as on supply and demand elasticities.

These graphs, first, depicted a situation of price protection both in importing and exporting regions. Second, price distortions in a two-region world model--importing and exporting--were represented. And finally, transmission of supply instability due to price fixing was brought to bear in the analysis.

It was the view of the authors that the agricultural protection policies used in industrialized nations maintain output in inefficient industries (as judged by world prices). The policies prohibit trade from developing countries and create price instability at world market. Finally, they stressed that agricultural protectionism in industrialized countries is one of the major causes of misallocated resources use.

In a more defined terms, using specific products, the authors went ahead and compared price distortions between developed countries and developing nations.

¹⁵M. D. Bale and E. Lutz, "Agricultural Protectionism in Industrial Nations and Its Global Effects: A Survey of Issues," World Bank Staff Working Paper, No. 248.

Bale and Lutz (1981) discussed government intervention in the determination of agricultural product prices.¹⁶ A comparison was made between Japan, West Germany, France, and Great Britain, and Thailand, Egypt, Argentina and Pakistan.

The real effects of agricultural price distortions were analyzed using nominal protection coefficients. This was used to measure the disparity between domestic output prices and world prices. The authors also calculated:

- the change in rural employment;
- welfare gain of producers;
- the change in government revenue;
- welfare gain of consumers;
- net social loss in consumption;
- the change in foreign exchange earnings; and
- net social loss in production.

It was the contention of the authors that as a result of price distortion, the levels of agricultural production in industrialized nations were higher than they would be without intervention, whereas agricultural output in developing countries was significantly smaller than what it would be in the absence of distortions. The results also showed that developing countries consume more and developed countries consume less than they would in the absence of price intervention measures. In general,

¹⁶M. D. Bale and E. Lutz, "Price Distortions in Agriculture and Their Effects: An International Comparison," American Journal of Agricultural Economics, 63 (1981), pp. 8-21.

they found that the pricing policies caused a reduction in the exports of developing countries, and a lessening of imports by the industrialized nations.

The authors have maintained that because "incorrect" price signals are being given to farmers, full potential in terms of allocation, production, and consumption was not being realized.

The authors once again considered the effects of specific trade intervention policies in importing and exporting countries. Bale and Lutz (1979) examined the effects of different trade intervention policies on international price instability.¹⁷

They worked with a two-region world model with one commodity, linear supply and demand functions and additive random disturbances. The variance in the world market price was taken as the standard against which variances resulting from different forms of price intervention either by the exporting or the importing country were compared.

It was calculated that a specific tariff imposed by the importing country region would lower the foreign price and raise the domestic price, but would have no effect on price variability in either of the two regions. On the other hand, an ad valorem tariff imposed by the importing region would increase the domestic price variance, while the price fluctuations in the exporting region are reduced. A fixed quota effectively would

¹⁷M. D. Bale and E. Lutz, "The Effects of Trade Intervention on International Price Instability," American Journal of Agricultural Economics, 61 (1979), pp. 512-516.

separate the two regions so that no instability is transmitted from one region to the other. By price fixing all domestically created instability is exported.

They also considered a case where domestic producers in the importing region are guaranteed a constant market share, i.e., the import quota is a constant share of total domestic consumption. Such measure resulted in the transmission of instability from the exporting to the importing region. The resulting price variance in the importing region would exceed both the free-trade and no-trade cases.

It was their contention, however, that the quantitative results depended on the slopes of the supply and demand functions as well as the size of the demand and supply disturbances.

Using mathematical analysis, with specific assumptions, Bhagwati (1974) elaborated on how instability is transmitted from one country to the other.¹⁸ The analysis was concerned with an evaluation of trade intervention by authorities through price-fixing.

He used a two-country, one commodity, equilibrium model of trade to show that price instability generated by random supply fluctuations in the importing country can be simplified through price-fixing.

The demand in Country 1 and 2 was given by:

$$d_i = a_i - b_i P + \delta_i$$

$$i = 1, 2 \text{ and supply was given by } S_i = \alpha_i + \beta_i P + \epsilon_i$$

¹⁸A. Bhagwati, "The Effects of Trade Interventions," The Economic Journal, 24 (1974), p. 212.

$i = 1, 2$, where: d_i is demand in country i ; S_i is supply in Country i ; and P is price. The terms $a_i, b_i, \alpha_i, \beta_i$ are fixed parameters and δ_i and ϵ_i denotes random variables distributed as $N(0, \sigma_{\delta_i})$ and $(0, \sigma_{\epsilon_i})$, respectively. Under free trade, aggregate excess demand is zero, i.e.,

$$\sum_i d_i - \sum_i S_i = 0$$

The equilibrium price was found to be:

$$P_W = \frac{\sum_i a_i - \alpha_i + \delta_i - \epsilon_i}{b_i + \beta_i}$$

and the variance of the free trade market price became:

$$\sigma_{P_W} = \frac{\sum_i \sigma_{\delta_i} + \sigma_{\epsilon_i}}{(b_i + \beta_i)^2},$$

provided that δ_i and ϵ_i are distributed independently.

If the price in the importing country is fixed at \bar{P}_2 , the equilibrium price in the exporting country becomes:

$$P_1 = \frac{\sum_i a_i + \alpha_i + \delta_i + \epsilon_i - \bar{P}_2 (b_2 + \beta_2)}{b_1 + \beta_1}$$

$i = 1, 2$, and the price variance is

$$\sigma_P = \frac{\sigma_{\delta_1} + \sigma_{\delta_2} + \sigma_{\epsilon_2} + \sigma_{\epsilon_1}}{(b_1 + \beta_1)^2}$$

It was the contention of the author that because of the result of price variance, as shown above, the instability in the improving country is thus exported to the exporting country. He maintained that governments

seem interested in price stability, particularly for agricultural commodities. Yet they are interested primarily in internal stability rather than in global stability.

Still on the same question of price variability at the international market, Shei and Thompson (1977) devised a simulation to show how different regional policies affect the world market price.¹⁹

A thirteen-region quadratic programming model of world wheat trade was utilized to simulate the effects of unanticipated quantity changes on prices in the world wheat market. This simulation was done under different degrees of trade restrictions.

Three scenarios characterized by different numbers of regions were specified. These were the regions that permit price signals from international markets.

As the number of countries whose wheat trade is price responsive increases in the simulation, the percentage change in world price becomes smaller. This was in response to a shock such as the United States' export control and unanticipated external factors.

It was the view of the authors that greater world market price variability results as more countries prevent world price signals from being reflected across their borders.

In order to provide some empirical evidence on the factors that create instability at the world market, Zwart and Meike (1979), evaluated the

¹⁹S. Y. Shei and R. L. Thompson, "The Impact of Trade Restrictions on Price Stability in the World Wheat Market," American Journal of Agricultural Economics, 59 (1977), p. 632.

effects of domestic pricing policies.²⁰

Two models were employed in the study. First, a theoretical model of price intervention was developed to show how common forms of intervention destabilize the world market price. Second, econometric model was employed to show that most countries in the world wheat market have policies which destabilize the wheat market.

The authors maintained that domestic pricing policies are a major cause of instability in international commodity market. The modification of such policies could be a viable alternative to buffer stocks.

The Global Welfare Implications

Just, Lutz, Schmitz, and Turnovsky (1978) analyzed the distribution of welfare gains from international price stabilization when prices are fixed by authorities in either the importing or the exporting country--the other country having a free market.²¹ They developed a mathematical model of two country with free trade.

Countries 1 and 2 having demand and supply functions:

1. $d_i = U_i D_i(P)$ for $D_i' < 0$ ($i = 1, 2$) and
2. $s_i = V_i S_i(P)$ for $S_i' > 0$ ($i = 1, 2$)

²⁰A. C. Zwart and K. D. Meike, "The Influence of Domestic Pricing Policies and Buffer Stocks on Price Stability in the World Wheat Industry," American Journal of Agricultural Economics, 61 (1979), pp. 434-445.

²¹R. Just; E. Lutz; A. Schmitz; and S. Turnovsky, "The Distribution of Welfare Gains from Price Stabilization," Journal of International Economics, 8 (1978), pp. 551-563.

where d_i is demand in country i , s_i is supply in country i , and P is price. The terms U_i and V_i denoted stochastic disturbances with means \bar{U}_i and \bar{V}_i , respectively. The producer and consumer prices in country 2 (taken to be the importing country) are assumed to be fixed by governmental policies at P^P and P^C , respectively.

Excess demand in country 1, the exporting country, was defined by:

$$1. \quad X_1(P, U_i, V_i) = U_i D_i(P) - V_i S_i(P)$$

where

$$2. \quad dX_i(P, u_i, v_i) / dP = X_{ip} = U_i D'_i(P) - V_i S'_i(P) < 0$$

Excess demand in country 2 was defined by:

$$3. \quad X_2(U_2, V_2) = u_2 D_2(P^C) - v_2 S_2(P^P)$$

Since country 1 was the exporting country and country 2 was the importing country,

$$4. \quad X_1 < 0 \text{ and } X_2 > 0$$

Aggregate excess demand was then defined by:

$$5. \quad X(P, u, v) = X_1(P, u_1, v_1) + X_2(u_2, v_2)$$

where $u = (u_1, u_2)$, $v = (v_1, v_2)$, and

$$6. \quad X_p = X_{1p} < 0 \text{ and } X_{pp} = X_{1pp} > 0$$

They solved these equations and arrived at this result:

$$7. \quad d^2 U_1 P / dv^2 = S^2(P^P) / X_{1p}^2 [-v_1 S'_1 + v_1 S_1 X_{1pp} / X_{1p}] < 0$$

From this result, they have concluded that under free trade, with convexity of the aggregate excess demand function, the importing country as a whole and consumers in both exporting and importing countries tend to gain from price stabilization, whereas exporting countries and producers in these countries tend to lose.

Thus, it was contended that with a high degree of nonlinearity, producers in both countries, as well as the exporting countries as a whole lose from stabilization, whereas consumer in both countries and the importing country gain.

This conclusion, though possessed very good policy implications, is restrictive because of the assumptions made, namely, price fixing in one country and free trade in the other.

In their attempt to look at welfare implications of price stabilization from another perspective, they added another assumption--multiplicative stochastic disturbance.

Just, Lutz, Schmitz, and Turnovsky (1977) were in this analysis concerned with the examination of the benefits to producers and consumers in both exporting and importing countries from stabilizing the price of internationally traded commodity.²²

They used a two-country model, a single market, and nonlinear demand and supply functions, with multiplicative stochastic disturbances.

Two countries, 1 and 2, having demand and supply functions:

$$1. d_i = u_i D_i(P), D'_i < 0, i = 1, 2$$

$$2. s_i = v_i S_i(P), S'_i > 0, i = 1, 2$$

where d_i is demand in country i , s_i is supply in country i , and P is price. The terms u_i and v_i denoted stochastic disturbances with means \bar{u}_i and \bar{v}_i , respectively, each having finite second moments.

²²R. Just; E. Lutz; and A. Schmitz, "The Distribution of Welfare Gains from International Price Stabilization under Distortions," American Journal of Agricultural Economics, 59 (1977), pp. 652-661.

Summing (1) and (2) separately over the two countries yields the aggregate demand and supply functions.

$$3. D(p, u) = u_1 D_1(p) + u_2 D_2(p)$$

$$4. S(p, v) = v_1 S_1(p) + v_2 S_2(p) \quad \text{where}$$

$$5. D_p(p, u) = u_1 D'_1(p) + u_2 D'_2(p) < 0$$

$$6. S_p(p, v) = v_1 S'_1(p) + v_2 S'_2(p) > 0$$

and

$$u = (u_1, u_2), v = (v_1, v_2).$$

Aggregate excess demand was then defined by:

$$7. X(p, u, v) = D(p, u) - S(p, v) \quad \text{where}$$

$$8. X_p = D_p(p, u) - S_p(p, v) < 0$$

From these, they calculated domestic demand fluctuations (U_1), foreign demand fluctuations (U_2), domestic supply fluctuations (V_1), and foreign supply fluctuations (V_2). The main conclusions reached from these calculations are the following:

Although price stabilization benefits the world as a whole, the distribution of these welfare gains to the various group (producers, consumers, and countries) cannot, in general, be decided unambiguously. They have maintained that the shape and position of the demand and supply functions, the types of disturbances, the country's origin, and for certain cases the sector origin of the disturbances, all play a role in determining the distribution of these gains. However, the convexity of the aggregate excess demand function tends to shift the distribution of gains from stabilization in favor of consumers in both countries and against producers in both countries.

Massell (1970) evaluating the same question--welfare implications of international price stabilization--restricted his analysis to a single market.²³ He presented a diagrammatic and an analytical frameworks that involved maximization of a producer's welfare function.

The welfare function contained as arguments the mean and variance of income and was assumed to be increasing in the former argument and decreasing in the latter. From the graphs, the author showed that producers are able to compensate consumers so as to leave both groups better off from price stability.

He contended that actual compensation was needed before it can be concluded that price stability is preferred to price instability.

However, no attempt was made in the analysis to determine whether or not price stabilization is socially desirable for individual trading nations in the absence of either domestic or international compensation.

Sandrum (1975), considering welfare gains and price stabilization, rejected the main point Massell made in his article.²⁴ Massell's analysis has the advantage that the expressions measuring the welfare gains from stabilization can be calculated explicitly. Sandrum contended that much relevant empirical work finds non-linear relationships, such as log-linear functions, to be superior, in which case the Massell's results are inapplicable.

²³B. F. Massell, "Some Welfare Implications of International Price Stabilization," Journal of Political Economy, LXXVII (1970), pp. 404-417.

²⁴R. M. Sandrum, "Welfare Gains from Price Stabilization," Canadian Journal of Economics, 11 (1976), pp. 133-147.

Sandrum's analysis was also confined to a single market, but with the assumption of multiplicative disturbances. He used the production functions and utility functions which underly the market supply and demand function, and evaluated the behavior of the supply side and the demand side independently and mathematically.

He stressed that the distribution of welfare gains from introducing a price stabilization scheme in a situation where the random disturbances are multiplicative, differ from those obtained by previous authors. The most important general difference is that the desirability of price stabilization for either producers or consumers does not depend upon the source of the price instability, but rather, upon the shapes of the deterministic components of the demand and supply curves. He maintained that if one group benefits from having price stabilized, it will do so whether the random price arises from stochastic disturbances in demand or in supply.

It was the author's view that producers gain from having either the demand or supply disturbances stabilized if demand is elastic and supply inelastic, while they lose in the reverse situation. Similarly, consumers tend to gain if supply is elastic and demand is inelastic and be worse off otherwise.

In order to evaluate the issue of welfare implications of grain price stabilization, using a specific product, and from the point of view of an exporting country, Konandreas (1978) restricted his analysis to the United States; since the United States is an exporter of wheat.²⁵

²⁵p. L. Konandreas, "Implications of Grain Price Stabilization," Canadian Journal of Economics, 32 (1978), pp. 501-517.

The model specified a United States domestic demand relationship for food and feed use; a stock relationship and a foreign demand sector; these were estimated by Ordinary and Two-Stage Least Squares methods.

The empirical study demonstrates that although the United States' producers and consumers taken together benefit from policies which would stabilize feed grain prices, this is not likely the case for wheat.

Finally, the central issue--who gains or who loses--is brought to bear in this analysis.

Hueth and Schmitz (1972) considered some welfare implications of destabilized prices, specifically who gains or who loses from destabilized prices of internationally traded commodities.²⁶

In a two-country model, they let the supply and demand functions be:

$$1. S_E = \beta_1 p + e_1$$

$$2. D_E = -\beta_2 p + e_2$$

for the exporting country, and

$$3. S_1 = \beta_3 p + e_3$$

$$4. D_1 = -\beta_4 p + e_4$$

for the importing country. The vector

$$5. \quad e = \begin{bmatrix} e_1 \\ e_2 \\ e_3 \\ e_4 \end{bmatrix}$$

²⁶D. Hueth and A. Schmitz, "International Trade in Intermediate and Final Goods: Some Welfare Implications of Destabilized Prices," The Quarterly Journal of Economics, LXXXVI (1972), pp. 351-365.

was a random vector assumed to have the following properties:

$$6. \quad Ee = u = \begin{bmatrix} u_1 \\ u_2 \\ u_3 \\ u_4 \end{bmatrix} \quad \Sigma e = \begin{bmatrix} \sigma_1^2 & 0 & 0 & 0 \\ 0 & \sigma_2^2 & 0 & 0 \\ 0 & 0 & \sigma_3^2 & 0 \\ 0 & 0 & 0 & \sigma_4^2 \end{bmatrix}$$

The equilibrium of excess supply and demand functions:

$$7. \quad Es(p) = (S_E - D_E) > 0$$

$$8. \quad Ed(p) = (D_1 - S_1) > 0$$

Equating equations (7) and (8) and solving for the equilibrium price, they had:

$$9. \quad p^* = e_2 - e_1 + e_4 - e_3 / \sum_i \beta_i$$

which is distributed with mean:

$$10. \quad Ep^* = p^e = u_2 - u_1 + w_2 - w_1 / \sum_i \beta_i$$

and variance

$$11. \quad \sigma_{p^*}^2 = \sum_i \sigma_{e_i}^2 / (\sum_i \beta_i)^2$$

International gain from stabilization was then expressed as:

$$12. \quad Wg = 1/2 (p^* - p^e) [Ed(p^e) - Es(p^e)],$$

The expected value of which is:

$$13. \quad EWg = \sum_i \sigma_{e_i}^2 / 2 \sum_i \beta_i > 0.$$

From these results, they have concluded that when one uses the expected value of the change in producer and consumer surplus as a measure of gain, price stabilization brought about a buffer stock, results in a net gain to world consumers and producers. But actual compensation is needed to obtain this result, and it must be at an international level. It was also shown that in the absence of compensation, producers or consumers in all countries do not gain or lose from price stability.

Summary

This literature review brings to focus the following points:

1. The major wheat exporting countries determine wheat prices because of their capacity to hold stock;
2. Protectionism has global effects including fluctuation of prices at the world market; and
3. The welfare implications show that whether or not an individual country benefits from price stability depends on the source of the instability; when the source of instability originates in only one of the two countries considered, that country will always prefer stabilized prices if domestic compensation is paid; price instability is preferable for the country that does not contribute to instability. If both countries contribute to price instability, the results, with respect to which country gains from price stabilization, are inconclusive. Finally, regardless of the source or extent of the instability when international compensation is paid, price stabilization is a desirable policy for both world consumers and producers.

CHAPTER III

THEORETICAL FRAMEWORK

Three models are employed in the analysis of this paper. First, standard partial equilibrium comparative static analysis in the Marshallian economic surplus framework²⁷--welfare theory--is used for the estimation of the following.

Net social loss in production

$$NSLp = 1/2 (Q_w - Q) (P_w - P_p) = 1/2 t p^2_{nsV} \dots\dots\dots (1)$$

Net social loss in consumption

$$NSLc = 1/2 (C_w - C) (P_c - P_w) = 1/2 t c^2_{nd w}; \dots\dots\dots (2)$$

Welfare gain of producers

$$G_p = Q (P_p - P_w) - NSLp; \text{ and } \dots\dots\dots (3)$$

Welfare gain of consumers

$$G_c = C (P_w - P_c) - NSLc. \dots\dots\dots (4)$$

The variables are defined as follows:

Q_w = Production at world price;

Q = Production at domestic price;

P_w = World price;

P_p = Price received by farmers;

P_c = Price faced by domestic consumers;

²⁷J. M. Currie; J. A. Martin; and A. Schmitz, "The Concept of Economics Surplus and Its Use in Economic Analysis," Economic Journal, 81 (1971), p. 743.

V = Value of production at P_p ;

W = Value of consumption at P_c ;

C_w = Consumption at world price;

C = Consumption at domestic price;

n_s = Elasticity of supply;

n_d = Elasticity of demand;

t_c = Proportion of tariff at the consumer level; and

t_p = Proportion of tariff at the producer level.

The proportion of tariff at the consumer level is defined as the difference between the price faced by domestic consumers and the world price. Also, the proportion of tariff at the producer level is defined as the difference between the price at the producer level and the world price.

The following assumptions are made in this paper:

- 1) The United States is an exporter of wheat;
- 2) The demand function is linear and negatively sloped;
- 3) The supply function is linear and positively sloped;
- 4) World price is equilibrium price, and at this price the difference between quantity supplied and demanded is zero; and
- 5) The quantity of wheat not exported is consumed domestically, i.e., the difference between the quantity produced, and the quantity exported is domestically consumed.

Second, a Marshallian demand function²⁸--theory of consumer behavior-- is employed through the use of Ordinary Least Squares Techniques to estimate

²⁸J. H. Henderson and R. E. Quandt, Microeconomic Theory: A Mathematical Approach, Third Edition (New York: McGraw-Hill Book, Inc., 1980).

the parameters in the aforementioned welfare theory.

The demand function gives the quantity of a commodity that a consumer will buy as a function of the commodity prices and the consumer's income.²⁹ Mathematically, this model can be represented as follows:

$$Q_d = f(P_1, P_2, Y^0) \dots\dots\dots (5)$$

This relationship satisfies the general assumption that demand functions are negatively sloped--the lower the price, the greater the quantity demanded. However, this study assumes a multiplicative relationship of the following form:

$$Q_{dw} = a_0 P_1^{a_1} P_2^{a_2} \dots\dots\dots (6)$$

which upon logarithmic transformation yields:

$$\log Q_{dw} = \log a_0 + a_1 \log P_1 + a_2 \log P_2 + U \dots\dots\dots (7)$$

Q_{dw} = Quantity of wheat demanded;

a_0 = The constant which represents the intercept coefficient;

a_1 = The price coefficient defined to satisfy the price elasticity interpretation;

a_2 = The positive income coefficient, also defined to satisfy the income elasticity interpretation; and

U = The error term.

Third, it is found that the wheat prices in the United States are greater than the equilibrium prices--world prices (Table 4). In order to show the effects of equilibrium price on the quantity of wheat in this

²⁹J. H. Henderson and R. E. Quandt, Microeconomic Theory: A Mathematical Approach, Third Edition (New York: McGraw-Hill Book, Inc., 1980).

country, partial equilibrium market model,³⁰ i.e., a linear model of price determination in an isolated market is employed.

The mathematical representations with defined parameters are as follows:

$$Q_d = A - \beta P: \text{ The demand function (8)}$$

$$Q_s = -\alpha + \delta P: \text{ The supply function (9)}$$

A, β, α , and δ are exogenous parameters defined to be greater than zero.

$$Q_d = Q_s: \text{ The equilibrium condition.}$$

$$(A - \beta P) = (-\alpha + \delta P): \text{ Setting } Q_d = Q_s \text{ (10)}$$

Thus, the equilibrium price:

$$\bar{P} = (A + \alpha) / (\beta + \delta) \cdot P > 0 \text{ (11)}$$

To obtain the equilibrium quantity, the equilibrium price is substituted into either the supply or demand equation.

$$\bar{Q} = A - \beta \bar{P} = A + \alpha / (\beta + \delta) = (A\delta - \beta\alpha) / (\beta + \delta) \cdot A\delta > \beta\alpha \text{ (11a)}$$

The purpose of this exercise is to show how the equilibrium value of an endogenous variable will change as a result of a change of any of the exogenous parameters. This is done to depict the situation of wheat market from the point of view of this country, and within the confines of comparative-static analysis.

It was determined that the equilibrium price

$$\bar{P} = (A + \alpha) / (\beta + \delta), \text{ and (12)}$$

³⁰A. C. Chiang, Fundamental Methods of Mathematical Economics, Second Edition (New York: McGraw-Hill Book, Inc., 1974).

since the emphasis is on the effect on quantity as a result of an increase in price, the analysis is restricted to the equilibrium price result.

$$\partial \bar{P} / \partial A = 1 / \beta + \delta : \dots\dots\dots (13)$$

$$\partial \bar{P} / \partial \beta = -(A + \alpha) / (\beta + \delta)^2 \dots\dots\dots (14)$$

$$\partial \bar{P} / \partial \alpha = 1 / \beta + \delta : \dots\dots\dots (15)$$

$$\partial \bar{P} / \partial \delta = -(A + \alpha) / (\beta + \delta)^2 \dots\dots\dots (16)$$

Because A, β , α , and $\delta > 0$, then

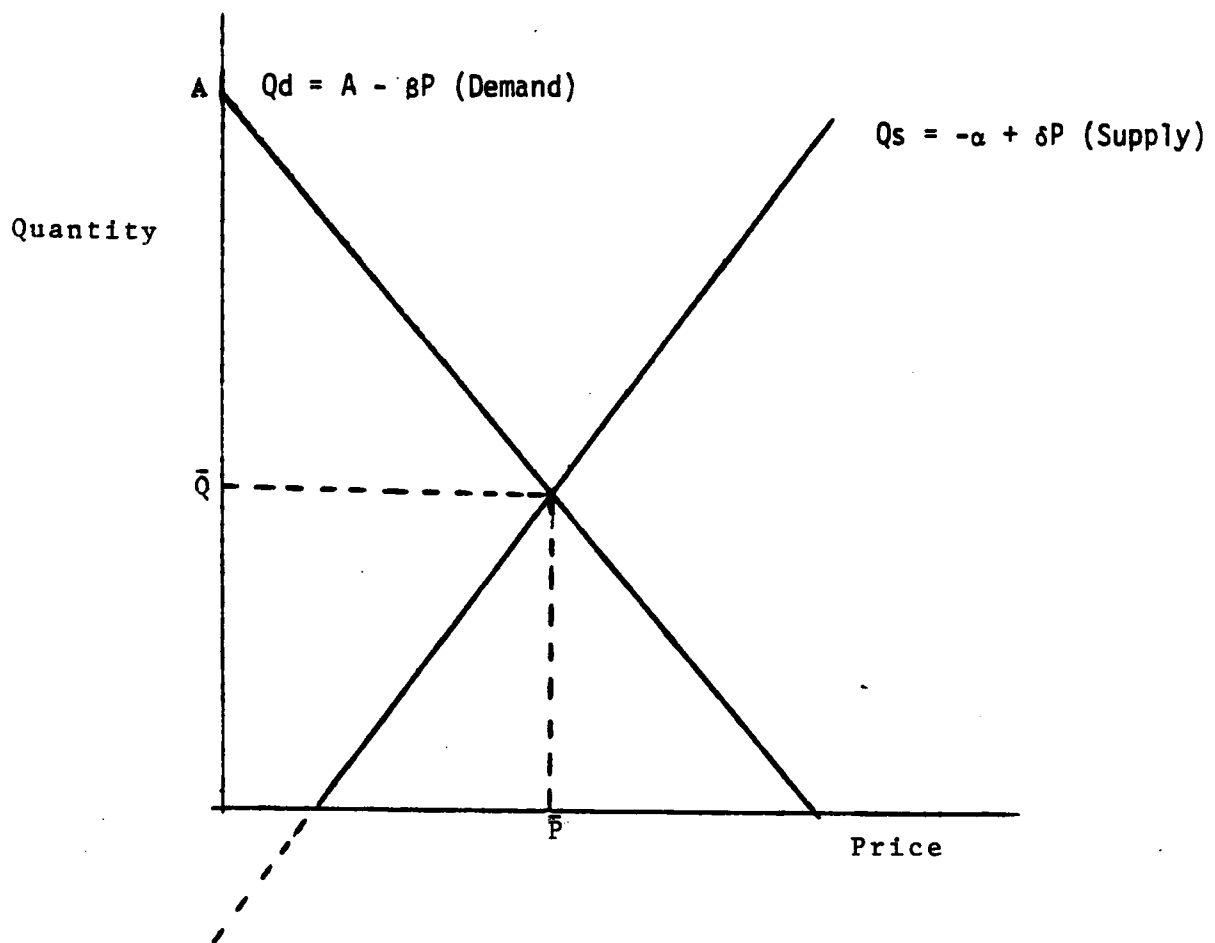
$$\partial \bar{P} / \partial A = \partial \bar{P} / \partial \alpha > 0 \text{ and } \partial \bar{P} / \partial \beta = \partial \bar{P} / \partial \delta < 0.$$

Diagrammatic representations (Figures 3, 4, 5 and 6) are provided to delineate the effect on price, and consequently on quantity as a result of a change in any of the exogenous parameters.

As evident on the graphs (Figures 3 and 5), increase in parameters A and α will raise the level of prices. However, the increase in prices as a result of a change in parameter α will consequently reduce the quantity levels. From the point of view of this study, therefore, exogenous parameter α then becomes income-support deficiency payment programs, "set-aside" schemes, and subsidies; since these are the programs used by authorities to distort the prices of agricultural commodities. These results will remain valid, regardless of specific values that the parameters A, β , α , and δ take, as long as they satisfy the sign restriction.

This author proposes that the effect on quantity as a result of an increase in parameters α will hold true in the wheat market of this country because of the following:

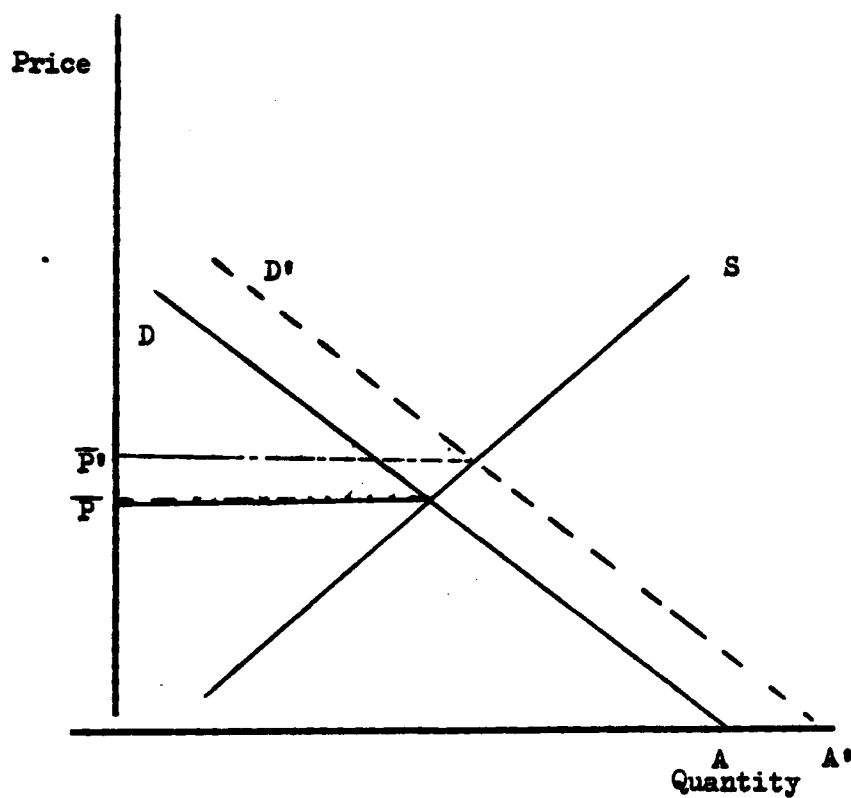
FIGURE 2
PARTIAL EQUILIBRIUM MARKET MODEL



A diagrammatic representation of the model.
Derived from equation (8) and (9).

FIGURE 3

AN INCREASE IN EXOGENOUS PARAMETER A

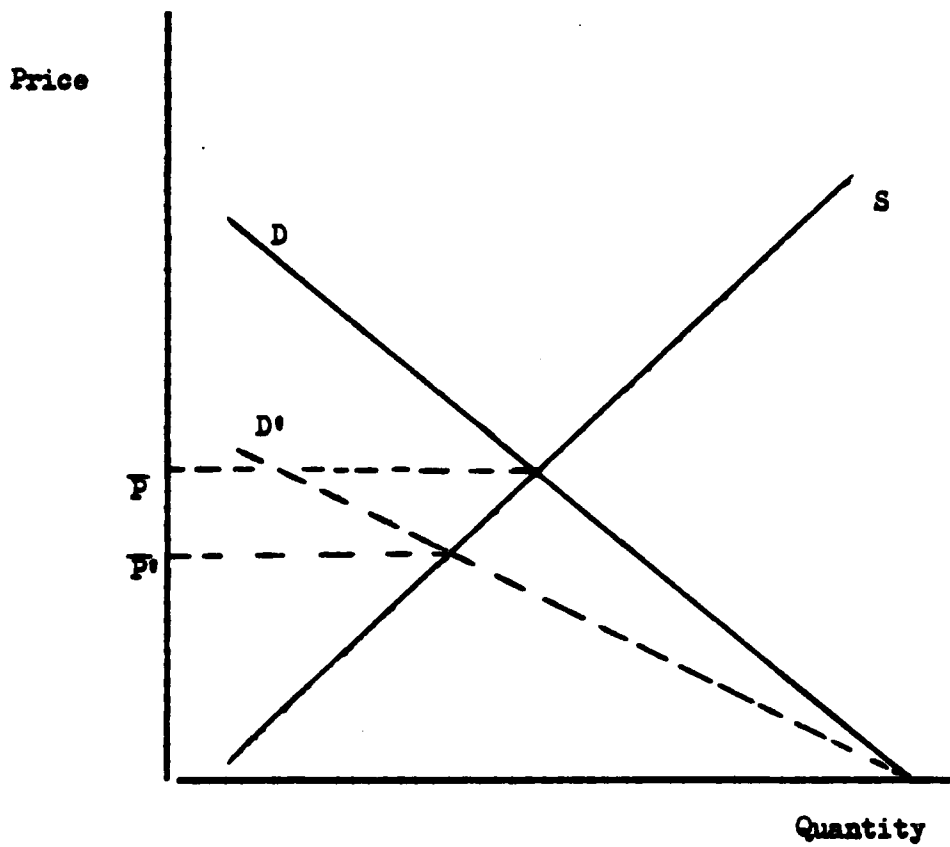


An increase in parameter A.

Derived from Equation (11)

FIGURE 4

AN INCREASE IN EXOGENOUS PARAMETER β



An increase in parameter β

Derived from Equation (11)

FIGURE 5
AN INCREASE IN EXOGENOUS PARAMETER α

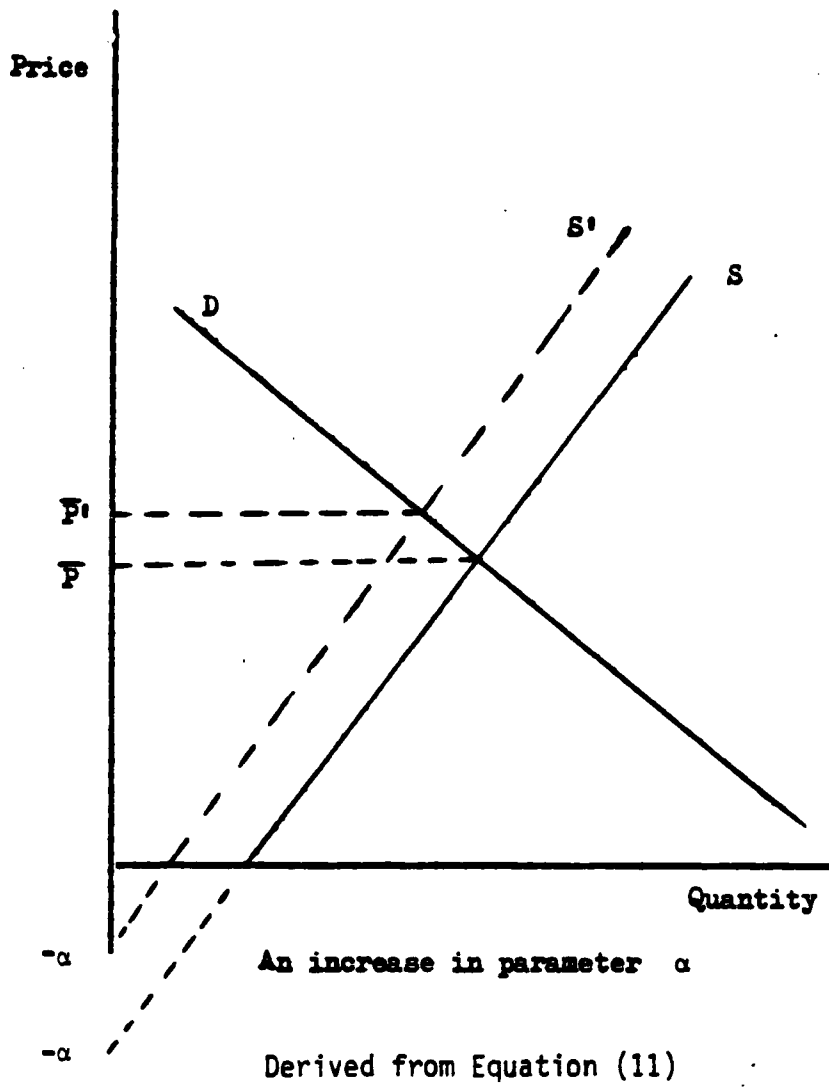
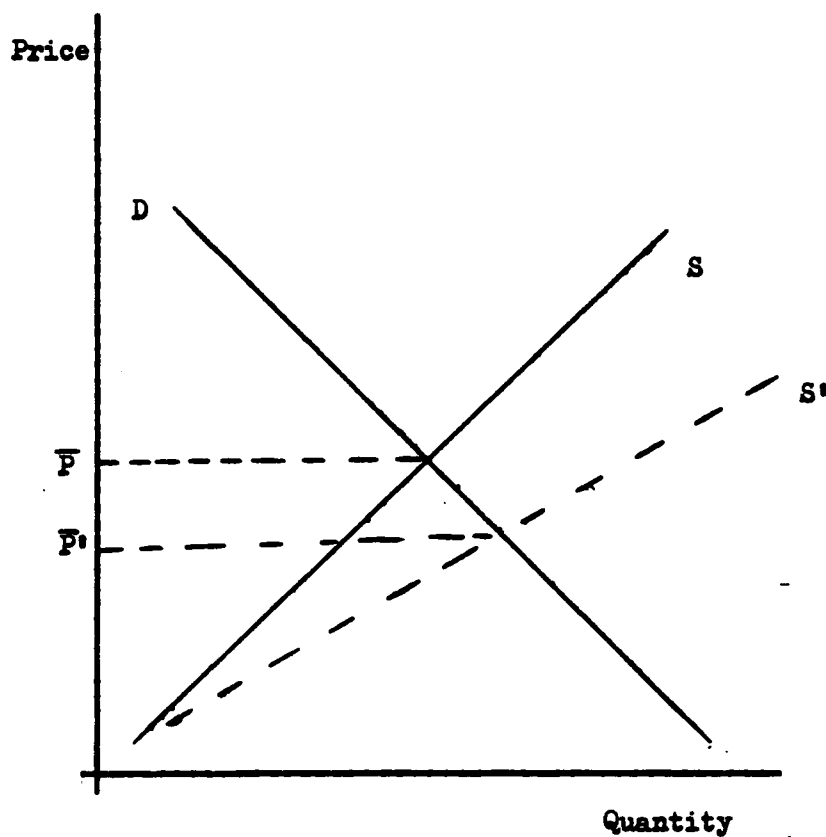


FIGURE 6
AN INCREASE IN EXOGENOUS PARAMETER δ



An increase in parameter δ

Derived from Equation (11)

- 1) Despite the fact that the United States is a major wheat exporter, it does not have the resources to monopolize the world market price. This is solely because of the influence exerted at the market by other major wheat exporters--Canada and Australia.
- 2) For any individual country to have a considerable influence on the world market, it must have a price that is commensurable with the world price.

CHAPTER IV

SUMMARY OF REGRESSIONS

Ordinary Least Squares (OLS) techniques were used in the regression estimations. The primary hypothesis specified in this study are that:

- 1) The price coefficient will have a negative sign, thus satisfying the price and quantity relationship which is stipulated in the model. The coefficient is also expected to be high and significant at 0.05 level.
- 2) The income coefficient is expected to be positive because negative income will violate the postulate of the model. The level of significance of this coefficient is not obvious since the considerable influence of government intervention policies on prices will have its effect on income.
- 3) The intercept coefficient is expected to be positive because of the specifications of the demand theory ($Q_d = f(p_1, p_2, Y^0)$), and also because the analysis is restricted to the first and positive quadrant.

Based on the estimated parameters (Table 1), if price goes up by 10 percent, the quantity demanded will go up by 3.9 percent. This is the case since the price coefficient is positive. This result, however, violates the price and quantity relationship of the negatively sloped demand function. Also, the positive price coefficient was found to be significant at 0.05 level.

TABLE 1
ESTIMATES OF PRICE AND INCOME ELASTICITIES

Variable	β -Value	t for H_0 : $\beta=0$	Standard Error	R^2	D.W.
Intercept	5.66	6.15	0.92	0.76	2.48
Price*	0.39	2.34	0.17		
Income**	0.37	2.35	0.16		

Source: Derived from estimated demand equation (6).

η = 15 (1968 - 1983). The number of observations.

K = 3 The number of parameter coefficients to be estimated-intercept, price, and income- defined in logarithmic form.

* = Price elasticity

** = Income elasticity

Another problem that was evident in the result is the Serial Correlation, which is typical when using time-series data. This is the case because the stochastic disturbance terms, in part, reflect variables not explicitly included in the model, and may change over time. In other words, the stochastic term at one observation, in most cases, will be related to the stochastic disturbance terms at nearby observation.³¹

In order to minimize the aforementioned problems, different sets of data--deviations from the means--for all the variables, were used (Table 2).

Theoretically, these results mean that if price should go up by 10 percent, quantity will go down by 8.165 percent. The results, though consistent with the assumption of negatively sloped demand function, present very unsatisfactory case. The test of serial correlation shows that the value falls within the Region of Indeterminacy. The R-Square of 0.25 means that the variables employed in this analysis account for only twenty-five percent of the wheat market. And above all, both coefficients for price and income were found to be insignificant at 0.05 level. The results were considered unsatisfactory because nothing in it replicates what is expected from the wheat market.

A couple of steps were taken to deal with the above problem:

(1) the number of observations (n) were increased; and (2) the coefficients to be estimated were again defined in logarithmic forms.

³¹M. D. Intriligator, Econometric Models Techniques and Applications, New Jersey: Prentice-Hall, Inc., 1978.

TABLE 2
ESTIMATES OF PRICE AND INCOME ELASTICITIES

Variable	β Value	t for H_0 : $\beta = 0$	Standard Error	R^2	D.W
Price*	-81.65	-1.22	66.97	0.25	1.34
Income**	8.75	1.72	5.09		

Source: Derived from estimated demand equation (6).

$n = 15$ (1968 - 1983). The number of observations.

$K = 3$. The coefficients to be estimated.

* = Price elasticity

** = Income elasticity

TABLE 3
ESTIMATES OF PRICE AND INCOME ELASTICITIES

Variable	β -Value	t for H_0 : $\beta = 0$	Standard Error	R^2	D.W.
Intercept	8.11	4.23	1.92	0.88	2.12
Price*	-.79	-2.00	0.39		
Income**	0.22	1.65	0.21		

Source: Derived from estimated demand equation (6).

$n = 25$. The number of observations (1958 - 1983).

$K = 3$. The parameter coefficient to be estimated; defined in logarithmic form.

* = Price elasticity

** = Income elasticity

The estimated parameters (Table 3) show that if price should go up by ten percent, the quantity demanded will go down by seventy-nine percent.

The coefficient for price, as shown by the results is negative. This is as expected, and is consistent with the postulate of the model, namely, negatively sloped demand curve--the lower the price, the greater the quantity demanded. Also, the coefficient is found to be significant at .05 level.

Although this value (-0.79) is greater than the elasticities used in this study, it is deemed representative of what is expected from the wheat market, and consistent with the results of earlier studies in this area.³²

The income coefficient is positive as expected, but insignificant at .05 level. This result brings to the open the central premise of this study--protectionism. It is not certain if the dominance of government intervention policies, as characterized by "set-aside" schemes, "deficiency payment programs," and subsidies, have rendered income of no major effect in the wheat market. However, the coefficient is found to be significant at 0.1 level.

The R-square value is 0.88. This means that eighty-eight percent of the wheat market is explained by the variables employed in this study. It should also be stressed that this result is representative of earlier

³²p. A. Carter, "Quotas and Pricing of Agricultural Commodities," Canadian Journal of Economics, 13 (1976), p. 552.

studies on price distortions by authorities.³³

The Dubin-Watson statistic shows that there is no problem of serial correlation between the dependent and explanatory variables. These results compare favorably with earlier studies on government intervention pricing policies. Specifically, Bale and Lutz have contended that the quantitative results of government intervention of agricultural products on prices depended on the slopes of the supply and demand functions as well as on the size of the demand and supply disturbances.³⁴

Welfare Measurement

In order to show the extent of the effects of protectionism on the welfare of consumers, we reestimate the net social loss in consumption and welfare gain of consumers, using the elasticity obtained in this study (Table 3). As shown in Tables 7 and 8, the welfare implications were underestimated by Rojko (Table 4). However, there is no contradiction between the results of the two estimations.

³³P. L. Konandreas, "Welfare Implication of Grain Price Stabilization," Journal of Economics, 12 (1975), p. 511.

³⁴M. D. Bale and E. Lutz, "The Effects of Trade Intervention on International Price Instability," American Journal of Agricultural Economics, 61 (1979), p. 515.

TABLE 4
THE DATA USED FOR THE ANALYSIS (WELFARE)

Year	U. S. & Mt.		Range of Supply Elasticities		Range of Demand Elasticities		('000 Metric Tons)		
	World Price	Estimated Domestic Price	Low	High	Low	High	Production	Consumption	Export
1979	168	190	.54	1.25	-.12	-.37	58,080	27,093	30,987
1980	175	200	.53	1.31	-.13	-.38	64,619	29,524	35,095
1981	148	170	.51	1.29	-.12	-.43	76,169	35,797	40,372
1982	132	157	.47	1.41	-.19	-.52	76,538	28,527	48,011
1983	163	189	.39	1.38	-.17	-.46	66,009	28,524	37,485

Source: (a) International Wheat Council, World Wheat Statistics, 1979-1883.

(b) Statistical Reporting Service, U. S. Department of Agriculture, 1984.

(c) Economics Statistics and Cooperative Service, U. S. Department of Agriculture, 1984.

(d) A. Rojko, Alternative Future for World Food in 1985, Washington, D.C.: U. S. Department of Agriculture, 1978.

TABLE 5
NET SOCIAL LOSS IN PRODUCTION AND CONSUMPTION

Year	Net Social Loss in Production		Net Social Loss in Consumption		Total Net Social Loss	
	Low	High	Low	High	Low	High
----- (in '000 U. S. Dollars) -----						
1979	826	1,943	- 8,886	-27,399	- 8,060	-25,456
1980	2,378	5,878	-13,121	-38,356	-10,743	-32,478
1981	3,174	8,030	-22,794	-74,081	- 8,742	-66,051
1982	12,608	30,820	-21,350	-62,525	- 8,742	-31,705
1983	5,038	12,358	-14,223	-42,671	- 9,185	-30,313

TABLE 6
WELFARE GAIN OF PRODUCERS AND CONSUMERS

Year	Welfare Gain of Producers		Welfare Gain of Consumers		Total Welfare Gain	
	Low	High	Low	High	Low	High
----- (in '000 U. S. Dollars) -----						
1979	92	1,025	-12,032	-30,545	-11,940	-29,520
1980	763	4,263	-21,196	-46,431	-20,433	-42,168
1981	943	5,790	-27,436	-78,723	-26,493	-72,933
1982	8,216	26,428	-25,900	-67,075	-17,684	-40,647
1983	2,595	9,915	-18,149	-46,597	-15,554	-36,682

TABLE 7
NET SOCIAL LOSS IN PRODUCTION AND CONSUMPTION

Year	Net Social Loss in Production		Net Social Loss in Consumption		Total Net Social Loss	
	Low	High	Low	High	Low	High
1979	826	1,943	- 8,886	-58,501	- 8,060	-56,558
1980	2,378	5,878	-13,121	-79,741	-10,743	-73,863
1981	3,174	8,030	-22,794	-85,649	-19,620	-77,619
1982	12,608	30,820	-21,350	-120,228	- 8,742	-89,408
1983	5,038	12,358	-14,223	-93,189	- 9,185	-80,831

TABLE 8
WELFARE GAIN OF PRODUCERS AND CONSUMERS

Year	Welfare Gain of Producers		Welfare Gain of Consumers		Total Welfare Gain	
	Low	High	Low	High	Low	High
1979	92	1,025	-12,032	-61,647	-11,940	-60,622
1980	763	4,263	-21,196	-83,441	-20,433	-79,178
1981	943	5,790	-27,436	-90,269	-26,493	-84,479
1982	8,216	26,428	-25,900	-124,778	-17,684	-98,350
1983	2,595	9,915	-18,149	-97,115	-15,554	-87,200

CHAPTER V

SUMMARY

This study was concerned with a quantification of the effects of government intervention in the pricing of wheat in the United States. Standard partial equilibrium comparative static analysis in the Marshallian economic surplus framework was used in the calculations of net social loss in production and consumption, and welfare gain of producers and consumers. The method of Ordinary Least Squares (OLS) was employed to estimate the parameter coefficients in the aforementioned model.

In the analysis, world wheat price was assumed to be the equilibrium price, and "partial market equilibrium"--a linear model--was used to elaborate on the effect on quantity of a price greater than the equilibrium price.

It was determined in this study that government intervention in the pricing of wheat has a negative rate of protection on the domestic consumption of wheat; i.e., the quantity of wheat consumed in this country is substantially less than the quantity it would have been in the absence of price distortions (Table 5).

Results

- 1) The intervention policies have positive rate of protection on production (Table 6). As a result, the levels of production under protectionism are higher than they would be in the absence of price distortions.

- 2) The importing country's imports and domestic consumption of wheat will both increase; a direct result of the pricing policies of the exporting country.
- 3) The total net social loss and net welfare gain were both found to be negative in this study. The results bring home the central issue in this analysis, namely, that the problems created by protectionism far exceed the benefits to the producers.
- 4) The net social loss in production turned out to be positive confirming the main postulate of this study--a price greater than the equilibrium price will reduce the quantity demanded. However, this result is a contrast to the one stated earlier that production levels under protectionism are higher than they would otherwise be.

The following reasons account for this discrepancy:

- 1) The wheat in the United States is a "special market." It is a market where the interaction of forces of demand and supply are almost absent. The market, to a greater extent, is characterized by the dictates of government authorities.
- 2) The stockholding capacity of this country is another factor that plays a very significant role in the wheat market. What is indubitable in this analysis is that yearly demand has little or nothing to do with yearly production. This is the justification for the effects of the embargo which were neither seen on production nor on prices.

Conclusion and Policy Consideration

The key point evident in this study is that the loss to consumers as a result of protectionism far exceed the benefits that accrue to the producers. As a result, government authorities are spending enormous amount of money to keep this program going. Bale and Lutz, analyzing this problem, have said "In recent years, deficiency payment in the United States have ranged from \$800 million to \$4 billion,...and one of the causes of misallocated resources use."³⁵

The considerable influence of government pricing policies, as manifested in "set-aside" schemes, deficiency payment programs, and subsidies have bearings in the determination of the quantity demanded in the wheat market. It is not certain if this influence is responsible for the insignificance of income at 0.05 level.

Price was found to be the variable that was playing the dominant role in the wheat market, thus confirming the following:

- 1) The government authorities of this country are able to prevent foreign competition because of the substantial influence they have over price.
- 2) This influence on price is enhanced by high inventory--capacity to hold stock--consequently enabling the retention of this country's market share.

³⁵M. D. Bale and E. Lutz, "Agricultural Protectionism in Industrialized Nations and Its Global Effects: A Survey of Issues," World Bank Staff Working Paper, No. 248.

- 3) The major wheat exporters--Canada, the United States, and Australia --as individual countries, do not have the resources to monopolize the world market price.
- 4) For any individual country to have a considerable influence on the world market, it must have a price that is commensurable with world price.

It is always gratifying to be among the people who are doing their best to provide the necessary information to help today's world into a better tomorrow. This endeavor is considered expedient in view of the quest for excellence which has become an obsession in today's world. More than before, reliable information is needed in the fields of employment, exports, imports, interest rate, inflation, investment, and a variety of other issues for prudent legislation formulations and efficient management. This paper, in all its facets and ramifications, is designed to be of use, hopefully, in this area.

Suggested Areas for Future Studies

- 1) There are varied opinions about the shape of the supply and demand functions of agricultural products. Economists doing studies in this area have treated these functions on the basis of assumptions--linear or nonlinear. Since the effectiveness of protectionism depends on the slopes and elasticities of these functions, determining which of the two is true will be a useful guide to future studies for the farm sector.

- 2) The estimation of a linear relationship when the actual relationship is nonlinear is a problem when using Ordinary Least Squares (OLS) technique, particularly when testing for Serial Correlation (Dubin-Watson). Like the case of the supply and demand functions, the stochastic disturbance term has been left to assumptions--additive or multiplicative--in studies relating to agricultural products. This author considers this phenomenon a dangerous tendency, since it is the value of Dubin-Watson that explains the "correlation" between the dependent and explanatory variables.

Assuming that the nonlinear relationship is estimated by a linear one, and the stochastic disturbance term is assumed to be additive, the positive and negative errors would tend to "bunch" together.³⁶ If, on the other hand, the disturbance term is assumed to be multiplicative, the results will be very different in a larger magnitude. Thus, determining which of the two is the case will be valuable in many respects.

³⁶M. D. Intriligator, Econometric Models, Techniques and Applications (New Jersey: Prentice-Hall, Inc., 1978).

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